SulTRAC

December 8, 2016

Ms. Karen Kirchner
Remedial Project Manager
U.S. Environmental Protection Agency
77 West Jackson (SR-6J)
Chicago, Illinois 60604

Subject: **Lusher Street Groundwater Site Quality Assurance Project Plan Addendum 3**
For Spot Plume Investigation
Lusher Street Groundwater Contamination Site, Elkhart, Indiana
Contract No. EP-S5-06-02, Work Assignment No. 136-RICO-05AB

Dear Ms. Kirchner:

SulTRAC has prepared this letter as an addendum to the document, *"Attachment B, Quality Assurance Project Plan (QAPP), Revision 1, Lusher Street Groundwater Contamination Site, Elkhart, Elkhart County, Indiana,"* dated August 13, 2010. The original QAPP was submitted under the Work Assignment (WA) for the Lusher Street Groundwater Contamination Site (Lusher Street Site) from the base period of the contract, WA 036-RICO-05AB. This letter addresses EPA's comments provided via email on December 1, 2016. This Spot Plume Investigation QAPP Addendum 3 is based on the U.S. Environmental Protection Agency (EPA)-approved Work Plan for the Lusher Street Site (SulTRAC 2011) as well as all sampling conducted to date under the previous WA.

QAPP revision is necessary to reflect modifications made to the Field Sampling Plan (FSP); details regarding the modifications are presented in the document "*Lusher Street Groundwater Site Field Sampling Plan Addendum 3 for Spot Plume Investigation,*" dated October 31, 2016. This QAPP Addendum 3 will describe field sampling procedures and laboratory analytical methods that will be used to define the vertical and horizontal extent (if any) of volatile organic compounds (VOCs) and 1,4-dioxane in shallow groundwater surrounding former grab groundwater location GW-04 at the Lusher Street Site. During the Remedial Investigation (RI), VOCs were detected in the shallow groundwater sample from GW-04. SulTRAC is proposing to collect groundwater samples from temporary grab groundwater locations, groundwater monitoring wells, and private residential water wells.

The information above has been incorporated in the following 13 worksheets, one (1) table, and one (1) figure:

Worksheet #1 – Title and Approval Page

Worksheet #5 – Project Organizational Chart

Worksheet #6 –- Communication Pathways

Worksheet #10 – Problem Definition

Worksheet #11 – Project Quality Objectives/Systematic Planning Process Statements

Worksheet #14 – Summary of Project Tasks

Worksheet #15 – Reference Limits and Evaluation Table

Worksheet #16 – Project Schedule/Timeline Table

Worksheet #17 – Sampling Design and Rationale

Worksheet #18 – Sampling Locations/IDs, Sample Depths, Sample Analyses, and Sampling Procedures

Worksheet #19 – Analytical Methods, Containers, Preservatives, and Holding Times Table

Worksheet #20 – Field Quality Control Sample Summary Table

Worksheet #33 – QA Management Reports Table

Table B-2 – Sampling Summary

Figure B-5 – Lusher Street Site Spot Plume Proposed Sampling Locations

Modifications on each of the worksheets and table are presented in **bold text**. Pages are numbered sequentially within this addendum.

SulTRAC appreciates the opportunity to serve EPA on this project and welcomes any comments or suggestions you may have. Please contact me by email at wearle@scst.com or by telephone at (312) 658-1141, extension 12, if you have any questions regarding the content of this letter.

Sincerely,

William Earle, P.E.
SulTRAC Project Manager

cc: Mr. Daniel Olsson, EPA CO (letter only)
Ms. Mindy Gould, SulTRAC
Mr. Dean Geers, SulTRAC

Attachments

WORKSHEET #1

WORKSHEET #5

WORKSHEET #6

WORKSHEET #10

WORKSHEET #11

WORKSHEET #14

WORKSHEET #15

WORKSHEET #16

WORKSHEET #17

WORKSHEET #18

QAPP WORKSHEET #1
TITLE AND APPROVAL PAGE

Lusher Street Groundwater Site Quality Assurance Project Plan Addendum 3 for Spot Plume Investigation
Document Title

SulTRAC
Lead Organization

William Earle, SulTRAC
Preparer's Name and Organizational Affiliation

125 S. Wacker Drive, Suite 220 Chicago, IL 60606; (312) 658-1141, ext. 12; wearle@scst.com
Preparer's Address, Telephone Number, and E-mail Address

December 8, 2016
Preparation Date (Day/Month/Year)

William Earle — Signature
SulTRAC Project Manager

John Dirgo — Digitally signed by: John Dirgo DN: CN = John Dirgo C = US O = Tetra Tech, Inc. OU = EMI Division Date: 2016.12.08 14:41:42 -06'00' — Signature
SulTRAC QA Officer

Approval Signatures:

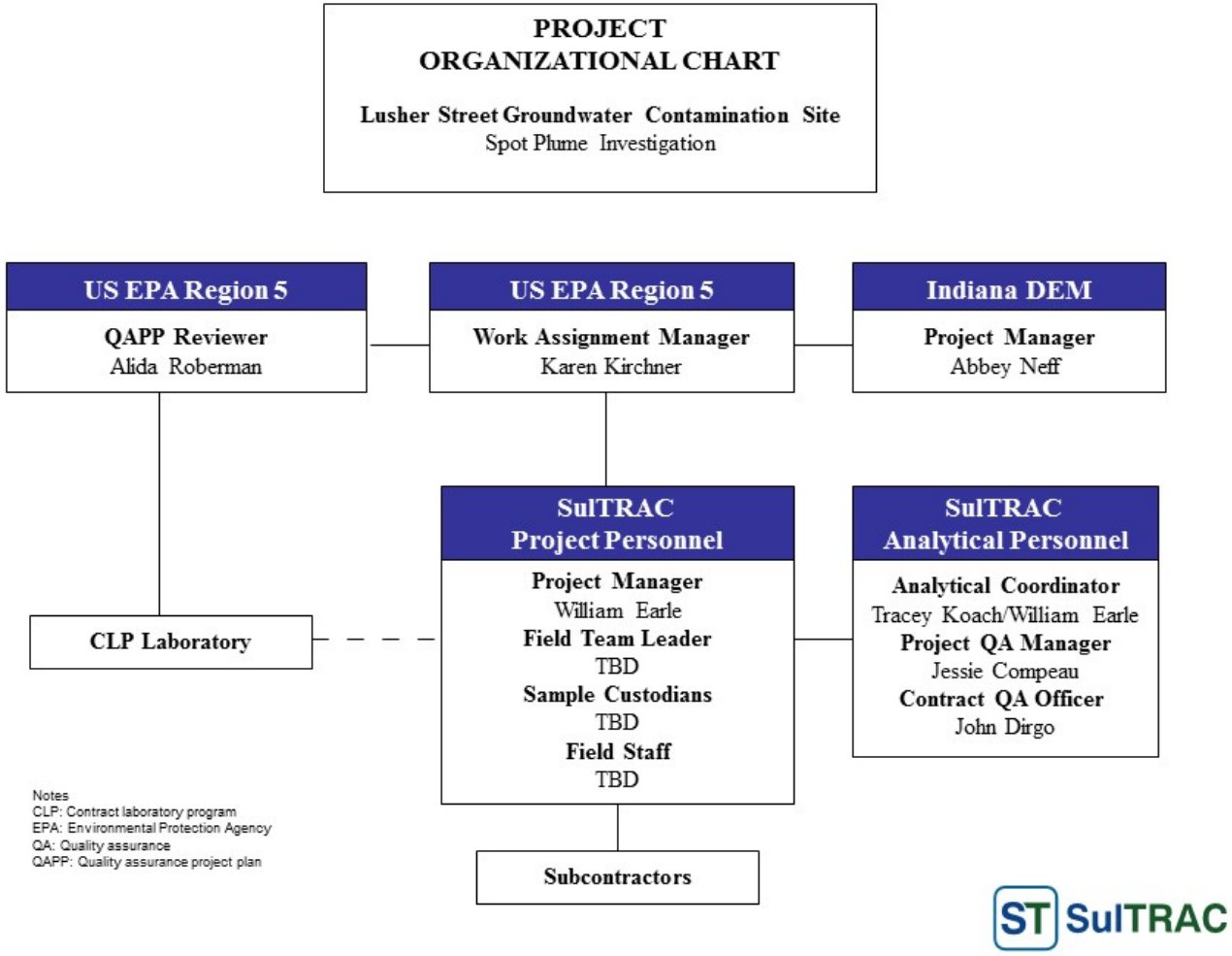
Karen Kirchner 12/8/16
Signature/Date
Karen Kirchner, Work Assignment Manager, EPA
Printed Name/Title

Approval Authority
Other Approval Signatures:

Alida Roberman 12/22/16
Signature/Date
Alida Roberman, QAPP Reviewer, EPA
Printed Name Title

Document Control Number:

QAPP WORKSHEET #5
PROJECT ORGANIZATIONAL CHART



QAPP WORKSHEET #6
COMMUNICATION PATHWAYS

(UFP QAPP Section 2.4.2)

Communication Drivers	Responsible Entity	Name	Telephone No.	Procedure (Timing, Pathways, etc.)
Point of contact with EPA WAM	Project Manager	William Earle	**(312) 658-1141, ext. 12**	William Earle will forward all materials and information about the project to Karen Kirchner.
Manage all project phases	Project Manager	William Earle	**(312) 658-1141, ext. 12**	Communicate information to project team (including subcontractors) on a timely basis. Notify EPA WAM by telephone or e-mail of any significant issues. Direct field team and facilitate communication with analytical coordinator. Delivery of all Contract Laboratory Program (CLP) data packages to project QA manager for final review of validation.
Daily field progress report	Field Team Leader	**TBD**	**TBD**	Conduct specific field investigation tasks, direct field activities of subcontractors, and provide daily communication with project manager and sample custodian.
Manage field sample organization and delivery to CLP	Sample Custodian	**TBD**	**TBD**	Ensure that field staff is collecting samples in proper containers, observing holding times, and properly packaging and preparing samples for shipment. Coordinate daily with analytical coordinator concerning sample quantities and delivery locations and dates. Communicate daily with field staff and project manager regarding any issues and developments.

Communication Drivers	Responsible Entity	Name	Telephone No.	Procedure (Timing, Pathways, etc.)
Point of contact with EPA Region 5 Regional Sample Control Coordinator (RSCC)	Analytical Coordinator	William Earle and Tracey Koach	**(312) 658-1141, ext. 12** **(312) 658-1141, ext. 11**	Contact the RSCC before each sampling event to schedule CLP laboratory services. Notify sample custodian and project manager of any CLP issues or developments. Track all CLP data deliveries. Notify project manager and forward data to him.
Release of Analytical Data	SulTRAC Project QA Manager	**Jessie Compeau**	**(206) 849-8494**	No analytical data can be released until validation is completed and Jessie Compeau has reviewed and approved the release.
Report of CLP laboratory data quality issues	Laboratory QA Officer	TBD[a]	TBD[a]	All QA/QC issues with project field samples will be reported by the laboratory QA officer to the RSCC.
Report of Subcontract laboratory data quality issues	Laboratory QA Officer	TBD	TBD	All QA/QC issues with project field samples will be reported by the laboratory QA officer to the SulTRAC Project QA Manager.

Notes:

[a] Due to the length of the field component of this project, personnel in this role may change.

QAPP WORKSHEET #10
PROBLEM DEFINITION

(UFP QAPP Section 2.5.2)

The problem to be addressed by the project: Previous groundwater investigations around the Lusher Street Site show ubiquitous VOC contamination. The primarily VOCs detected are PCE, TCE, and 1,1,1-TCA. This project intends to fully characterize the extent of VOC contamination and to determine the type and extent of other contaminants in groundwater within the Lusher Street Site boundaries.
The environmental questions being asked: What is the extent of contamination at the Lusher Street Site? **Additional grab groundwater, monitoring well, and private residential well samples are being collected in the area of the "spot plume," in the vicinity of Borneman Avenue and 20th Street (Remedial Investigation [RI] sample GW-04), to evaluate whether the "spot plume" is still present and to define the plume's extent, if still present.**
Observations from any site reconnaissance reports: During the 2006 IDEM investigation, groundwater concentrations exceeding the federal MCL were reported in 10 wells at the Lusher Street Site. The chemicals of concern have been identified as potentially hazardous to human health and safety.
A synopsis of secondary data or information from site reports: See Worksheet #13
The possible classes of contaminants and the affected matrices: All groundwater samples from residential wells will be analyzed for VOCs. In addition, approximately 50% of groundwater samples from residential wells will be analyzed for VOCs, SVOCs, PCBs, pesticides, and target analyte list (TAL) metals (including mercury). All VAS, including VAS-PSA, locations will be analyzed onsite by a mobile laboratory for VOCs, and 10% of VAS samples will be analyzed offsite through CLP for VOCs, SVOCs, PCBs, pesticides, and TAL metals (including mercury). If necessary, soil samples will be collected and analyzed offsite through CLP for VOCs, SVOCs, PCBs, pesticides, TAL metals (including mercury). In addition, up to 10 soil samples will be analyzed for grain size distribution, porosity, and TOC. The newly installed groundwater wells will be sampled for and analyzed offsite through CLP for VOCs only, and the PSA newly installed groundwater monitoring wells will be sampled for and analyzed offsite through CLP for VOCs, SVOCs, PCBs, pesticides, and TAL metals (including mercury). No other matrices will be sampled during the Phase IA investigation. During Phase II vapor intrusion (VI) will be investigated with a stepped-approach. Collect groundwater grab samples using direct-push technologies at the water table. If the groundwater sample results exceed the VI criteria for groundwater, soil gas sampling points will be installed. If soil gas sample results exceed the VI criteria for soil gas, sub-slab sampling points in approximately 20% of the residences from the blocks that exceeded the VI criteria will be installed. If the sub-slab gas samples exceed the VI criteria for sub-slab gas, indoor air samples will be collected in all homes that exceed the VI criteria. **The RI report determined that VOCs in groundwater were contaminants of the "spot plume."**

Project decision conditions ("If…, then …" statements): If the RI results reveal that contamination at the Lusher Street Site poses an unacceptable risk to human health and/or the environment, then a feasibility study will be performed to remedial action will be implemented. **During the "spot plume" investigation, isolated detections of VOCs in GW-04 will be characterized to determine if further groundwater contamination is present within the vicinity of GW-04, and the results will be used to identify a possible source. If the data demonstrates that there is no unacceptable risk, the interim Record of Decision (ROD) will be amended, via an Explanation of Significant Differences (ESD) or ROD amendment, to remove the "spot plume" area from the selected remedy. If the investigation demonstrates that there is risk, then the existing ROD will be evaluated to see if it adequately addresses the risk.**

QAPP WORKSHEET #11
PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS

(UFP QAPP Section 2.6.1)

Who will use the data? EPA Region 5 and SulTRAC will use the data.
What will the data be used for? During the Phase IA field investigation, the data will be used to characterize the extent of contamination, as well as potential source areas of contamination. Data from both the Phase I and Phase IA investigations will be used to conduct a risk assessment for the Lusher Street Site and to evaluate remedial alternatives as part of a subsequent FS. During the Phase II field investigation, the data will be used to determine if the groundwater contamination present at Lusher Street Site is contributing to a vapor intrusion (VI) issue within the residences. In order to determine if the contamination of the groundwater present at the site is volatizing and entering the homes above, it will be necessary to gather all investigative information in a step-approach. Therefore, each step will be carefully evaluated upon receipt of the results prior to gathering data for the subsequent step. If at any point in the process there is no indication of contamination exceeding the sampling criteria, it will be determined that vapor intrusion is not an issue at the site. **During the "spot plume" investigation, isolated detections of volatile organic compounds (VOCs) in GW-04 will be characterized to determine if further groundwater contamination is present within the vicinity of GW-04, and the results will be used to identify a possible source. If the data demonstrates that there is no unacceptable risk, the interim Record of Decision (ROD) will be amended, via an Explanation of Significant Differences (ESD) or ROD amendment, to remove the "spot plume" area from the selected remedy. If the investigation demonstrates that there is risk, then the existing ROD will be evaluated to see if it adequately addresses the risk.**

QAPP WORKSHEET #11 (CONTINUED)
PROJECT QUALITY OBJECTIVES/SYSTEMATIC PLANNING PROCESS STATEMENTS

What type of data are needed (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques)? Groundwater (VAS, VAS-PSA, residential well, monitoring well) and soil samples will be collected from the Lusher Street Site. Groundwater samples will be collected from existing residential drinking water wells, VAS locations, and newly installed groundwater monitoring wells. Field screening instruments will include (1) a photoionization detector (PID) to screen all groundwater and soil boring samples, (2) a water quality meter to monitor all groundwater parameters during sampling, and (3) a mobile lab with a gas chromatograph/mass spectrometer (GC/MS) to analyze VAS groundwater samples for VOCs. The mobile lab with GC/MS will be operated by the EPA and/or EPA's ESAT Contractor. Groundwater samples from the residential wells will be sent to an off-site laboratory to be analyzed for all of or a subset of the following analyses: VOCs, SVOCs, pesticides, PCBs, and TAL-metals. VAS groundwater samples will be sent to an on-site lab, supplied and operated by EPA so that the results can be available to make field decisions as to where to screen monitoring wells at the VAS location. The on-site lab will analyze the samples for VOCs using a field GC/MS. In addition, 10% of samples will be sent to an off-site laboratory and analyzed for VOCs, SVOCs, pesticides, PCBs, and TAL-metals. Soil samples will be collected during the monitoring well installation when gross soil contamination is observed, based on visual and field screening techniques. Soil samples will be analyzed at an off-site laboratory for all of or a subset of the following analyses: VOCs, SVOCs, pesticides, PCBs, and TAL-metals. In addition, 10 soil samples will be submitted for additional subcontract analysis (grain size distribution, porosity, and TOC). Groundwater samples from the newly installed monitoring wells will be sent to an off-site laboratory to be analyzed for all VOCs. Groundwater (grab samples from direct push borings) samples will be collected from the Lusher Street Site. Field screening instruments will include (1) a photoionization detector (PID) to screen all groundwater samples, and (2) an off-site laboratory to analyze groundwater samples for VOCs. Soil gas vapor samples, sub-slab vapor samples, indoor air samples, and ambient air samples will be sent to an off-site subcontracted laboratory to be analyzed for VOCs. Air samples will be collected with a Summa® canister to maintain the highest sample integrity**. "Spot plume" grab groundwater, monitoring well, and private residential well samples will be analyzed for VOCs and 1,4-dioxane at an off-site CLP laboratory.**
How "good" do the data need to be in order to support the environmental decision? Ultimately, the data need to allow full assessment of the nature and extent of contamination in the water and soil samples collected by SulTRAC. The data also need to be validated and used to support risk assessment and the evaluation of remedial alternatives. In addition, the data need to determine if the groundwater contamination present at the site is volatizing and entering the homes above**. The "spot plume" data will be used to identify if an isolated plume exists in the vicinity of GW-04, and its possible source. The data from the "spot plume" investigation will require validation so that it can be used for risk management decisions.**

How much data are needed (number of samples for each analytical group, matrix, and concentration)? SulTRAC will collect 94 residential groundwater samples; 476 samples from 17 vertical aquifer sample locations (17 locations, samples at 5-foot depth intervals from groundwater table from 10 ft bgs to a total depth of 150 ft bgs); and 50 groundwater samples from 50 newly installed Phase IA monitoring wells. Up to 50 soil samples will be collected during the monitoring well installation. SulTRAC will collect a groundwater sample from each residential block from the streets trending east-west from each of the three areas described in the Phase 2 Field Sampling Plan, Addendum 2. The 50 groundwater grab samples collected will be submitted to a Contract Laboratory Program (CLP) laboratory and analyzed for volatile organic compounds (VOCs). SulTRAC estimates 80 soil gas samples, 66 sub-slab gas samples, 44 indoor air samples, and 15 background air samples will be collected. **SulTRAC will collect an additional 22 groundwater samples from 11 temporary grab groundwater locations (water table samples and shallow groundwater samples); up to 9 private residential well groundwater samples; and water table or shallow groundwater samples from MW-001-S, MW-003-WT, MW-021-S, and MW-111-S. All groundwater samples will be submitted to a CLP laboratory and analyzed for VOCs and 1,4-dioxane.**

In addition to the above quantities, QC samples will be collected and analyzed, including duplicates, matrix spikes (MS), matrix spike duplicates (MSD), and trip blanks (see Worksheet #20).

Where, when, and how should the data be collected/generated? Phase IA sampling activities will take place from late spring through summer 2010 at the Lusher Street Site. Groundwater samples will first be collected from 94 residential wells. Vertical aquifer sampling locations will be confirmed based on the results from the residential well sampling. Seventeen VAS locations will be advanced, with samples being collected at 10-foot intervals from the water table to a maximum depth of 150 ft bgs. In addition, 11 VAS-PSA locations will be advanced in 10-foot intervals using a direct push rig to a maximum depth of 30 to 50 feet bgs. Groundwater monitoring wells will then be installed at the VAS and VAS-PSA locations, with the exception of locations VAS-PSA-109 through VAS-PSA-113. Up to two wells will be installed at each VAS and VAS-PSA location. Well depths and screen locations will be finalized in the field prior to installation.

Soil samples will be collected during monitoring well installation when gross contamination is observed. Up to 2 soil samples will be collected at each VAS location, with a total of 50 soil samples. Drilling will be conducted using a rotosonic drill rig and a direct push drill rig (for PSA locations only). All intrusive work will be performed by subcontractors under the supervision of a SulTRAC geologist.

Phase II soil gas and related groundwater sampling will take place from fall 2011 to spring 2012 at the Lusher Street Site. Groundwater samples will be collected from each residential block from the streets trending east-west from each of the three following areas: Lusher – Northwest Residential Area, bounded approximately by the St. Joseph River; Nappanee St., the Norfolk Southern (former Contrail) railroad tracks, and Flake St. (extended north to the River); the Lusher – West Residential Area, bounded approximately by Fieldhouse Ave., Nappanee St., Leininger Ave. and 17th St.; and the Lusher – East Residential Area, bounded by Wolf St., 15th St., Leininger Ave., and Oakland Ave. If the groundwater sample results exceed the vapor intrusion (VI) criteria for groundwater, SulTRAC will install soil gas sampling points within the right-of-way of streets at a frequency of one per block for every street. SulTRAC will use a direct-push drill rig to install semi-permanent soil gas sampling points. The soil gas sample results will be used to determine if sub-slab sampling is warranted. If soil gas sample results exceed the VI criteria for soil gas, SulTRAC will install sub-slab sampling points in approximately 20% of the residences from the blocks that exceeded the VI criteria. SulTRAC has estimated a total of 220 residences in the three areas of concern and maximum of 44 residences that may have sub-slab gas sampling points installed. If the sub-slab gas samples exceed the VI criteria for sub-slab gas, SulTRAC will proceed with the indoor air sampling in all homes that exceed the VI criteria. Samples will be collected in the location where vapor intrusion is most likely to occur such as the basement or the crawl space. Concurrently, a sub-slab sample will be collected in 50% of the homes where indoor air samples are collected. SulTRAC will collect 24 hour time-averaged samples for all samples collected for the indoor air. An ambient air sample will be collected on a rate of one per day of indoor air sampling. It is estimated that 3 indoor air samples locations can be sampled in one field day for a maximum of 15 background samples.

During the Lusher Street Site "spot plume" investigation, groundwater sampling will take place during fall 2016. Groundwater will be collected from 11 temporary grab groundwater locations within the right-of-way, four existing monitoring well locations, and up to 9 private residential wells. The "spot plume" site is bounded by W. Lusher Ave. to the north, 18th Street to the east, Leininger Ave. to the south, and State Route 19 (S. Nappanee Street) to the west. Grab groundwater samples will be collected in the rights-of-way on Markle Ave., Borneman Ave., Leiniger Ave., the alley between Borneman and Leininger, and between 19th Street and State Route 19. SulTRAC will use a direct-push rig to install borings at the temporary grab groundwater locations.

SulTRAC anticipates hiring subcontractors to perform soil gas sampling point installation, sub-slab gas sampling point installation**,** VAS, monitoring well installation, **temporary grab groundwater boring installation,** and site trailer mobilization.

Who will collect and generate the data? SulTRAC will collect the samples discussed herein. VAS samples will be sent to an on-site laboratory, supplied by EPA. A laboratory from the EPA CLP will analyze soil and groundwater samples for VOCs, SVOCs, PCBs, pesticides, and TAL metals (including mercury). SulTRAC will contract a laboratory to analyze the air samples. Sample results for specific analytes detailed in worksheet #15 will be reported at the method detection limit (MDL) in order to meet the requirements of the project action level (PALs). Reporting specific analytes at the MDL will be submitted as a modified analyses request and will be submitted 3 weeks in advance of sampling to the EPA Sample Management Office (SMO).
How will the data be reported? Data will be reported by the CLP laboratory using standard CLP data reporting techniques. Data will be reported in electronic and hard-copy form. Subcontracted laboratory data will be reported by the subcontracted laboratory using standard data reporting techniques. Data from the on-site mobile lab (by EPA) will be reported within 24 hours of sample analysis.
How will the data be archived? Electronic and hard copies of CLP analytical data will be archived by the CLP laboratory. Electronic and hard copies of subcontracted laboratory data will be archived by the SulTRAC analytical coordinator. Field data (notebooks, sampling sheets, etc.) will be maintained at SulTRAC's Chicago office. SulTRAC will also provide *10-year data* storage.

QAPP WORKSHEET #14
SUMMARY OF PROJECT TASKS

(UFP QAPP Section 2.8.1)

Sampling Tasks:

1. Collect water samples from up to 94 on-site residential wells for VOCs. Collect water samples from 50% of residential wells for full suite of analytes (VOCs, SVOCs, pesticides, PCBs, TAL metals).
2. Collect water samples through vertical aquifer sampling at 10-foot depth intervals, up to a depth of 150 ft bgs, at up to 17 locations.
3. Collect water samples through vertical aquifer samples at PSA locations at 10-foot depth intervals, up to a depth of 30 to 50 feet bgs, at up to 11 locations (8 locations to 30 feet, 3 locations to 50 feet).
4. Install and develop up to 50 new monitoring wells at vertical aquifer sampling locations. Up to two wells will be installed at each VAS and VAS-PSA location, with the exception of VAS-PSA-109 through VAS-PSA-113.
5. Collect soil samples as necessary during vertical aquifer sampling when grossly contaminated soils are encountered. Up to 10 soil samples will be collected for additional analyses (grain size distribution, porosity, and TOC).
6. Collect groundwater samples from the 50 newly installed monitoring wells using low-flow pumps.
7. Collect 50 groundwater samples from direct push well points.
8. Collect up to 80 soil gas samples based on the groundwater analytical results from samples collected in 7 above.
9. Collect up to 44 sub-slab air samples based on the soil gas analytical results from samples collected in 8 above.
10. Collect up to 44 indoor air and 22 sub-slab air samples based on the analytical results from sub-slab air samples collected in 9 above.
11. Collect up to 15 background, or ambient, air samples.
12. **Collect 22 groundwater samples from 11 additional direct-push well locations for VOCs and 1,4-dioxane near GW-04.**
13. **Collect an additional 4 groundwater samples from MW-001-S, MW-003-WT, MW-021-S, and MW-111-S for VOCs and 1,4-dioxane.**
14. **Collect groundwater samples from up to 9 private residential wells for VOCs and 1,4-dioxane near GW-04.**
15. Record sample locations using GPS.
16. Conduct a wetland and habitat delineation/function and value assessment and a screening of databases for endangered species and others of special concern.
17. Take digital photographs to document activities.
18. Log activities and tasks in field logbook.
19. Prepare sample documentation such as chain-of-custody forms, sample labels, custody seals, etc.

Analysis Tasks: An on-site EPA laboratory will analyze VAS and VAS-PSA samples for VOCs only. The CLP laboratory will analyze soil and groundwater (residential well samples, **grab groundwater samples, groundwater samples from selected monitoring wells,** and VAS confirmation samples from newly installed monitoring wells) samples for VOCs, and select samples for VOCs, SVOCs, PCBs, pesticides, and

TAL metals (including mercury). A subcontract laboratory will analyze the selected soil samples for grain size distribution, porosity, and TOC. **A CLP laboratory will analyze the groundwater samples for VOCs and 1,4-dioxane.**
QC Tasks: The following QC samples will be collected and analyzed during the sampling event: field duplicates, MS/MSD samples, rinsate blanks, and trip blanks (See worksheet #20).
Secondary Data: See Worksheet #13.

Reference Limits Table –Water

(Note: For Addendum 3, the only changes to worksheet #15 were for VOA and 1,4-Dioxane).

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
VOA/CLP	Dichlorodifluoromethane	75-71-8	**2.0E+01**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Chloromethane	74-87-3	**1.9E+01**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Vinyl chloride	75-01-4	**2.0 E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Bromomethane	74-83-9	**7.50E-01**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Chloroethane	75-00-3	**2.10E+03**	**RSL-tapwater**	NC	5.00E-01	5.00E+00
VOA/CLP	Trichlorofluoromethane	75-69-4	**5.20E+02**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	1,1-Dichloroethene	75-35-4	**7.0E+01**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Acetone	67-64-1	**1.40E+03**	**RSL-tapwater**	NC	5.00E+00	1.00E+01
VOA/CLP	Carbon disulfide	75-15-0	**8.1E+01**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Methyl acetate	79-20-9	**2.00E+03**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Methylene chloride	75-09-2	**5.00E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Trans-1,2-Dichloroethene	156-60-5	**7.0E+01**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Methyl tert-butyl ether	1634-04-4	**1.40E+01**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	1,1-Dichloroethane	75-34-3	**5.0E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Cis-1,2-Dichloroethene	156-59-2	**7.0E+01**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	2-Butanone	78-93-3	**5.60E+02**	RSL-tapwater	NC	5.00E+00	1.00E+01
VOA/CLP	Bromochloromethane	74-97-5	**8.3E+00**	RSL-Tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Chloroform	67-66-3	**8.0E+01 as TTHM**	MCL	NC	5.00E-01	5.00E+00
VOA/CLP	1,1,1-Trichloroethane	71-55-6	2.00E+02	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Cyclohexane	110-82-7	**1.30E+03**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	Carbon tetrachloride	56-23-5	**5.00E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Benzene	71-43-2	**5.0E+00**	MCL	NC	5.00E-01	5.00E+00
VOA/CLP	Dichlorodifluoromethane	75-71-8	**2.00E+01**	RSL-tapwater	NC	5.00E-01	5.00E+00
~~**VOA/CLP**~~	~~**1,4-Dioxane**~~	~~**123-91-1**~~	~~**6.11E+00**~~	~~**RSL-tapwater**~~	~~**NC**~~	~~**NC**~~	~~**1.00E+02**~~

QAPP WORKSHEET #15 (CONTINUED)
REFERENCE LIMITS AND EVALUATION TABLE

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
VOA/CLP	Trichloroethene	79-01-6	**5.0E+00**	**Interim ROD (Sept 2014), MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Methylcyclohexane	108-87-2	NC	NC	NC	5.00E-01	5.00E+00
VOA/CLP	1,2-Dichloropropane	78-87-5	**5.0E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Bromodichloromethane	75-27-4	**8.0E+01 as TTHM**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Cis-1,3-Dichloropropene [b]	10061-01-5	**4.7E-01**	**RSL-tapwater as 1,3-dichloropropene**	**NC**	5.00E-01	5.00E+00
VOA/CLP	4-Methyl-2-pentanone	108-10-1	**6.30E+02**	RSL-tapwater	NC	5.00E+00	1.00E+01
VOA/CLP	Toluene	108-88-3	**1.0E+03**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Trans-1,3-Dichloropropene [b]	10061-02-6	**4.7E-01**	**RSL-tapwater as 1,3-dichloropropene**	**NC**	5.00E-01	5.00E+00
VOA/CLP	1,1,2-Trichloroethane	79-00-5	**5.0E+00**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Tetrachloroethene	127-18-4	**5.00E+00**	**MCLr**	NC	5.00E-01	5.00E+00
VOA/CLP	2-Hexanone	591-78-6	**3.80E+00**	RSL-tapwater	NC	5.00E+00	1.00E+01
VOA/CLP	Dibromochloromethane	75-25-2	**8.0E+01 as TTHM**	MCL	NC	5.00E-01	5.00E+00
VOA/CLP	1,2-Dibromoethane[b]	106-93-4	**5.0E-02**	**MCL**	5.00E-02	5.00E-01	5.00E+00
VOA/CLP	Chlorobenzene	108-90-7	**1.0E+02**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Ethylbenzene	100-41-4	**7.0E+02**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	o-Xylene	1330-20-7	**1.0E+04 as total xylenes**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	m,p-Xylene	1330-20-7	**1.0E+04 as total xylenes**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	Styrene	100-42-5	1.00E+02	MCL	NC	5.00E-01	5.00E+00
VOA/CLP	Bromoform	75-25-2	**8.0E+01 as TTHM**	MCL	NC	5.00E-01	5.00E+00
VOA/CLP	1,1,2,2-Tetrachloroethane [b]	79-34-5	**7.60E-02**	RSL-tapwater	NC	5.00E-01	5.00E+00
VOA/CLP	1,3-Dichlorobenzene	**541-73-1**	**NC**	**NC**	**NC**	5.00E-01	5.00E+00
VOA/CLP	1,4-Dichlorobenzene	**106-46-7**	**7.5E+01**	**MCL**	NC	5.00E-01	5.00E+00

QAPP WORKSHEET #15 (CONTINUED)
REFERENCE LIMITS AND EVALUATION TABLE

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
VOA/CLP	1,2-Dichlorobenzene	95-50-1	**6.0E+02**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	1,2-Dibromo-3-chloropropane [b]	96-12-8	2.0E-01	**MCL**	5.00E-02	5.00E-01	5.00E+00
VOA/CLP	1,2,4-Trichlorobenzene	120-82-1	**7.0E+01**	**MCL**	NC	5.00E-01	5.00E+00
VOA/CLP	1,2,3-Trichlorobenzene	87-61-6	**7.00E-01**	RSL-tapwater	NC	5.00E-01	5.00E+00

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
SVOA/CLP	**1,4-Dioxane [b]**	**123-91-1**	**4.60E-01**	**RSL-tapwater**	**NC**	**NC**	**2.00E+00**
	Except for some revisions to the notes, this worksheet was not revised below this line. The information below this line is not relevant for the spot plume investigation.						
SVOA/CLP	Benzaldehyde	100-52-7	3.65E+03	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Phenol	108-95-2	1.10E+04	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Bis(2-chloroethyl)ether [b]	111-44-4	1.19E-02	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	2-Chlorophenol	95-57-8	3.80E+01	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2-Methylphenol	95-48-7	1.80E+03	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2,2'-Oxybis(1-chloropropane) [b]	108-60-1	3.23E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	4-Methylphenol	106-44-5	1.80E+02	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	Acetophenone	98-86-2	3.65E+03	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	N-Nitroso-di-n propylamine [b]	621-64-7	9.61E-03	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Hexachloroethane [b]	67-72-1	4.80E+00	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Nitrobenzene [b]	98-95-3	1.22E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Isophorone	78-59-1	7.08E+01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	2-Nitrophenol	88-75-5	NC	NC	NC	NC	5.00E+00
SVOA/CLP	2,4-Dimethylphenol	105-67-9	7.30E+02	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	2,4-Dichlorophenol	120-83-2	1.10E+02	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Naphthalene	91-20-3	1.43E-01	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	4-Chloroaniline [b]	106-47-8	3.36E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Hexachlorobutadiene [b]	87-68-3	8.62E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Caprolactam	105-60-2	1.83E+04	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	4-Chloro-3-methylphenol	59-50-7	3.65E+03	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	2-Methylnaphthalene	91-57-6	3.10E+01	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	Hexachlorocyclopentadiene	77-47-4	5.00E+01	RSL-MCL	NC	NC	5.00E+00
SVOA/CLP	2,4,6-Trichlorophenol [b]	88-06-2	3.60E+00	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2,4,5-Trichlorophenol	95-95-4	3.60E+03	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	1,1-Biphenyl	92-52-4	1.83E+03	RSL-tapwater	NC	NC	5.00E+00

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
SVOA/CLP	2-Chloronaphthalene	91-58-7	6.10E+02	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2-Nitroaniline	88-74-4	1.10E+02	IDEM-Res	NC	NC	1.00E+01
SVOA/CLP	4,6-Dinitro-2-methylphenol [b]	534-52-1	3.65E+00	RSL-tapwater	NC	NC	1.00E+01
SVOA/CLP	N-Nitrosodiphenylamine	86-30-6	1.37E+01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	1,2,4,5-Tetrachlorobenzene	95-94-3	1.10E+01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Hexachlorobenzene [b]	118-74-1	4.20E-02	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	2,4,6-Trichlorophenol [b]	88-06-2	3.60E+00	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2,4,5-Trichlorophenol	95-95-4	3.60E+03	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	Dimethylphthalate	131-11-3	3.60E+05	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2,6-Dinitrotoluene	606-20-2	3.65E+01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Acenaphthylene	208-96-8	7.10E+01	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	3-Nitroaniline	99-09-2	NC	NC	NC	NC	1.00E+01
SVOA/CLP	Acenaphthene	83-32-9	4.60E+02	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	2,4-Dinitrophenol	51-28-5	7.30E+01	IDEM-Res	NC	NC	1.00E+01
SVOA/CLP	4-Nitrophenol	100-02-7	NC	NC	NC	NC	1.00E+01
SVOA/CLP	Dibenzofuran	132-64-9	1.50E+01	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	2,4-Dinitrotoluene [b]	121-14-2	2.17E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Diethylphthalate	84-66-2	2.90E+04	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	Fluorene	86-73-7	3.10E+02	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	4-Chlorophenyl-phenyl ether	7005-72-3	NC	NC	NC	NC	5.00E+00
SVOA/CLP	4-Nitroaniline [b]	100-01-6	3.36E+00	RSL-tapwater	NC	NC	1.00E+01
SVOA/CLP	Hexachlorobenzene [b]	118-74-1	4.20E-02	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Atrazine [b]	1912-24-9	2.92E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Pentachlorophenol	87-86-5	5.60E-01	RSL-tapwater	2.00E-01	NC	1.00E+01
SVOA/CLP	Phenanthrene	85-01-8	2.30E+01	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	Anthracene	120-12-7	2.30E+03	IDEM-Res	1.00E-01	NC	5.00E+00
SVOA/CLP	Carbazole	86-74-8	4.30E+01	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	Di-n-butylphthalate	84-74-2	3.60E+03	IDEM-Res	NC	NC	5.00E+00

QAPP WORKSHEET #15 (CONTINUED)
REFERENCE LIMITS AND EVALUATION TABLE

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
SVOA/CLP	Fluoranthene	206-44-0	1.46E+03	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Pyrene	129-00-0	1.10E+03	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Butylbenzylphthalate	85-68-7	3.54E+01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	3,3'-Dichlorobenzidine	91-94-1	1.49E-01	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Benzo(a)anthracene [b]	56-55-3	2.95E-02	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Chrysene	218-01-9	2.95E+00	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Bis(2-ethylhexyl)phthalate	117-81-7	4.80E+00	RSL-tapwater	NC	NC	5.00E+00
SVOA/CLP	Di-n-octylphthalate	117-84-0	1.50E+03	IDEM-Res	NC	NC	5.00E+00
SVOA/CLP	Benzo(b)fluoranthene [b]	205-99-2	2.95E-02	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Benzo(k)fluoranthene	207-08-9	2.95E-01	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Benzo(a)pyrene [b]	50-32-8	2.95E-03	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Indeno(1,2,3,-cd)pyrene [b]	193-39-5	2.95E-02	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	Dibenzo(a,h)anthracene [b]	53-70-3	2.95E-03	RSL-tapwater	1.00E-01	NC	5.00E+00
SVOA/CLP	2,3,4,6-Tetrachlorophenol	58-90-2	1.10E+03	RSL-tapwater	NC	NC	5.00E+00
PCB/CLP	Aroclor-1016 [b]	12674-11-2	4.30E-01	IDEM-Res	NC	NC	1.00E+00
PCB/CLP	Aroclor-1221 [b]	11104-28-2	6.80E-03	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1232 [b]	11141-16-5	6.80E-03	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1242 [b]	53469-21-9	3.36E-02	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1248 [b]	12672-29-6	3.36E-02	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1254 [b]	11097-69-1	3.36E-02	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1260 [b]	11096-82-5	3.36E-02	RSL-tapwater	NC	NC	1.00E+00
PCB/CLP	Aroclor-1268 [b]	11100-14-4	4.30E-01	IDEM-Res	NC	NC	1.00E+00

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
Pesticide/CLP	alpha-BHC [b]	319-84-6	1.07E-02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	beta-BHC [b]	319-85-7	3.74E-02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	delta-BHC [b]	319-86-8	3.74E-02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	gamma-BHC (Lindane)	58-89-9	6.11E-02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	Heptachlor [b]	76-44-8	1.49E-02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	Aldrin [b]	309-00-2	3.96E-03	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	Heptachlor epoxide [b]	1024-57-3	7.39E-03	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	Endosulfan I	115-29-7	2.19E+02	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	Dieldrin [b]	60-57-1	4.20E-03	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	4,4'-DDE	72-55-9	1.98E-01	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	Endrin	72-20-8	2.00E+00	RSL-MCL	NC	NC	1.00E-01
Pesticide/CLP	Endosulfan II	33213-65-9	2.19E+02	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	4,4'-DDD	72-54-8	2.80E-01	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	Endosulfan sulfate	1031-07-8	2.19E+02	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	4,4'-DDT	50-29-3	1.98E-01	RSL-tapwater	NC	NC	1.00E-01
Pesticide/CLP	Methoxychlor	72-43-5	4.00E+01	RSL-MCL	NC	NC	5.00E-01
Pesticide/CLP	Endrin ketone	72-20-8	2.00E+00	RSL-MCL	NC	NC	1.00E-01
Pesticide/CLP	Endrin aldehyde	72-20-8	2.00E+00	RSL-MCL	NC	NC	1.00E-01
Pesticide/CLP	alpha-Chlordane	5103-71-9	1.92E-01	RSL-tapwater	NC	NC	5.00E-02
Pesticide/CLP	gamma-Chlordane	5103-74-2	2.00E+00	RSL-MCL	NC	NC	5.00E-02
Pesticide/CLP	Toxaphene [b]	8001-35-2	6.11E-02	RSL-tapwater	NC	NC	5.00E+00

QAPP WORKSHEET #15 (CONTINUED)
REFERENCE LIMITS AND EVALUATION TABLE

Analytical Group	Analyte	CAS Number	Project Action Level – Water (µg/L)	PAL Source [a]	CRQL - SIM Water (µg/L)	CRQL - TRACE Water (µg/L)	CRQL - LOW Water (µg/L)
TAL Metals/CLP	Aluminum	7429-90-5	3.65E+04	RSL-tapwater	NC	NC	2.00E+02
TAL Metals/CLP	Antimony	7440-36-0	6.00E+00	RSL-MCL	2.00E+00	NC	6.00E+01
TAL Metals/CLP	Arsenic [b]	7440-38-2	4.48E-02	RSL-tapwater	1.00E+00	NC	1.00E+01
TAL Metals/CLP	Barium	7440-39-3	2.00E+03	RSL-MCL	1.00E+01	NC	2.00E+02
TAL Metals/CLP	Beryllium	7440-41-7	4.00E+00	RSL-MCL	1.00E+00	NC	5.00E+00
TAL Metals/CLP	Cadmium	7440-43-9	5.00E+00	RSL-MCL	1.00E+00	NC	5.00E+00
TAL Metals/CLP	Calcium	17852-99-2	NC	NC	NC	NC	5.00E+03
TAL Metals/CLP	Total Chromium	7440-47-3	1.00E+02	RSL-MCL	2.00E+00	NC	1.00E+01
TAL Metals/CLP	Cobalt	7440-48-4	1.10E+01	RSL-tapwater	1.00E+00	NC	5.00E+01
TAL Metals/CLP	Copper	7440-50-8	1.30E+03	RSL-MCL	2.00E+00	NC	2.50E+01
TAL Metals/CLP	Iron	7439-89-6	2.56E+04	RSL-tapwater	NC	NC	1.00E+02
TAL Metals/CLP	Lead [b]	7439-92-1	3.65E-03	RSL-tapwater	1.00E+00	NC	1.00E+01
TAL Metals/CLP	Magnesium	7439-95-4	NC	NC	NC	NC	5.00E+03
TAL Metals/CLP	Manganese	7439-96-5	8.76E+02	RSL-tapwater	1.00E+00	NC	1.50E+01
TAL Metals/CLP	Mercury	7439-97-6	5.65E-01	RSL-tapwater	NC	NC	2.00E-01
TAL Metals/CLP	Nickel	7440-02-0	7.30E+02	RSL-tapwater	1.00E+00	NC	4.00E+01
TAL Metals/CLP	Potassium	7440-22-4	1.80E+02	IDEM-Res	1.00E+00	NC	1.00E+01
TAL Metals/CLP	Selenium	7782-49-2	5.00E+01	RSL-MCL	5.00E+00	NC	3.50E+01
TAL Metals/CLP	Silver	7440-22-4	1.80E+02	IDEM-Res	1.00E+00	NC	1.00E+01
TAL Metals/CLP	Sodium	7440-23-5	NC	NC	NC	NC	5.00E+03
TAL Metals/CLP	Thallium	7440-28-0	2.00E+00	RSL-MCL	1.00E+00	NC	2.50E+01
TAL Metals/CLP	Vanadium [b]	7440-62-2	2.56E+00	RSL-tapwater	5.00E+00	NC	5.00E+01
TAL Metals/CLP	Zinc	7440-66-6	1.10E+04	RSL-tapwater	2.00E+00	NC	6.00E+01

Notes:

AES Atomic emission spectroscopy
CAS Chemical Abstract Services
CLP Contract Laboratory Program
CRQL Contract-required quantitation limit
ICP Inductively coupled plasma
IDEM Indiana Department of Environmental Management

QAPP WORKSHEET #15 (CONTINUED)
REFERENCE LIMITS AND EVALUATION TABLE

MCL Maximum Contaminant Level
µg/L Microgram per liter
NC No criteria
PAL Project action level
RSL Regional Screening Level

a **The PAL for Addendum 3 of this QAPP is set preferentially at the remedial goal value in the September 2014 ROD (for vinyl chloride) or the MCL (as of October 2016) where available. Otherwise the PAL is the most conservative value of the following values:**
RSL-tapwater: **updated to May 2016 RSL tap water value for VOCs and 1,4-dioxane only, from the 10-6/THQ=0.1 table.**
RSL-MCL: December 2009 MCL value
IDEM-Res: IDEM Risk-Integrated System of Closure (RISC) residential health protective value, May 2009
IDEM-Ind: IDEM Risk-Integrated System of Closure (RISC) industrial health protective value, May 2009
IDEM-Res: IDEM Risk-Integrated System of Closure (RISC) residential health protective value, March 2016
IDEM-Ind: IDEM Risk-Integrated System of Closure (RISC) industrial health protective value, March 2016

b The PAL value exceeds the CLP CRQL (trace) for this analyte. The scope of work will request that the CLP laboratory report the analyte concentration at the MDL and flag the result with an estimated value flag (J flag) **or analysis via trace-SIM will be used**.

QAPP WORKSHEET #16
PROJECT SCHEDULE/TIMELINE TABLE

(UFP QAPP Section 2.8.2)

Activity	Organization	Date		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	**Anticipated Date of Completion**		
Phase IA Field Sampling	SulTRAC	August 2010	December 2010	Site Management Plan Phase IA FSP Phase IA QAPP Data Management Plan Health and Safety Plan	30 days after Phase IA work plan approval
Phase IA Data Evaluation	SulTRAC	January 2011	March 2011	Technical Memorandum: Phase IA Investigation	45 days after receipt of Phase IA validated data
Phase IA Completion	SulTRAC	May 2011	June 2011	Work Assignment Completion Report (WACR)	45 days after receipt of the Work Assignment Closeout Notification (WACN)
Phase II Field Sampling	SulTRAC	October 2011	March 2012	Remedial Investigation Report	September 30, 2012
Spot Plume Investigation	**SulTRAC**	**November - December 2016**	**December 2016**	**Spot Plume Investigation Report (Technical Memorandum or Letter Report)**	**Draft document within 45 days of receipt of validated sample results, targeting March 2017**

QAPP WORKSHEET #17
SAMPLING DESIGN AND RATIONALE

(UFP QAPP Section 3.1.1)

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be collected, and the sampling frequency (including seasonal considerations). (May refer to map or Worksheet #18 for details).

The Phase IA field investigation will characterize the contamination sources and delineate the extent of contamination. Therefore, groundwater and soil samples will be collected as summarized below.

SulTRAC will collect one sample from each residence that is using private water wells. All samples will be analyzed offsite at a CLP laboratory for VOCs, with 50% of the residences sampled for the full range of contaminants (VOCs, SVOCs, pesticides, PCBs, and TAL-metals). Proposed residential well sampling locations are shown on Figure B-3.

Following the residential sub-phase, SulTRAC will proceed with a detailed evaluation of the groundwater plume as part of the delineation sub-phase. The objective is to develop information to determine the horizontal and vertical extent of groundwater contamination. This investigation will be performed in one event consisting of a combination of vertical aquifer sampling (VAS) and monitoring well installation. The VAS (including VAS-PSA locations) is proposed at 28 locations to be performed at 10-foot intervals from the groundwater surface to either the bottom of the aquifer (estimated to be 150 feet bgs) or to 30 to 50 feet bgs for the VAS-PSA locations. Samples will be sent to an on-site lab, supplied by EPA, and analyzed for VOCs. In addition, a subset of 10% of the samples will be sent to an off-site CLP laboratory for VOCs.

Up to two monitoring wells will be installed at each VAS location, with the exception of VAS-PSA-109 through VAS-PSA-113, where no monitoring wells will be installed. The well depths will be determined based on the VAS and residential well results. All wells are assumed to have 10-foot screens. Following the installation of the monitoring wells, they will be developed. One round of groundwater sampling is assumed. Groundwater sampling will be conducted by low-flow sampling protocols.

Up to two subsurface soil samples will be collected from each VAS location (up to 50 samples) during monitoring well installation. The 28 VAS locations will be finalized based on the results from the residential field sampling. The VAS-PSA locations will be finalized based on property access agreements by the facility owners. The exact location of each VAS point will be selected and marked in the field following the residential well sampling (see Figure B-3). Soil samples will be collected where contamination is suspected, based on visual and field screening techniques. Soil samples will be analyzed for VOCs, SVOCs, PCBs, pesticides, and TAL metals.

A technical memorandum will be submitted to the EPA detailing the results of the Phase IA field investigation.

In order to determine if the groundwater contamination present at the Lusher Street Site is contributing to a vapor intrusion (VI) issue within the residences, SulTRAC will collect data in a step approach. SulTRAC will collect groundwater samples at 50 locations in three areas based on previous VAS and residential groundwater sampling. If the groundwater sample results exceed the VI criteria for groundwater, SulTRAC will install soil gas sampling points within the right-of-way of streets at a frequency of one per block for every street up to 80 locations. If soil gas sample results exceed the VI criteria for soil gas, SulTRAC will install sub-slab sampling points in approximately 20% of the residences from

the blocks that exceeded the VI criteria. SulTRAC has estimated a total of 220 residences in the three areas of concern and assumed a maximum of 44 residences that may have sub-slab gas sampling points installed. If the sub-slab gas samples exceed the VI criteria for sub-slab gas, SulTRAC will proceed with the indoor air sampling in all homes that exceed the VI criteria. Samples will be collected in the location where vapor intrusion is most likely to occur such as the basement or the crawl space. If no basement or crawl space exist, then the indoor air samples will be collected from the main floor near the middle of the structure. Concurrently, a sub-slab sample will be collected in 50% of the homes where indoor air samples are collected. SulTRAC has estimated a total of 44 indoor air and 22 sub-slab air samples to be collected. In addition, 15 ambient air, or background air, samples will be collected as part of the quality assurance program.

The "spot plume" investigation will characterize the extent (if any) and potential exposures to VOC and 1,4-dioxane contamination which may be present around GW-04. SulTRAC will collect 22 groundwater samples from 11 temporary groundwater sample locations around GW-04; samples will be collected at the water table and 5 to 10 feet below the water table at each location. SulTRAC will also collect four groundwater samples from existing monitoring wells MW-001-S, MW-003-WT, MW-021-S, and MW-111-S from only the shallow or water table depths; and up to 9 groundwater samples from private residential water wells surrounding GW-04, depending upon access. Samples will be analyzed for VOCs and 1,4-dioxane. Field duplicates at a rate of 1 in 10 samples and MS/MSDs at a rate of 1 in 20 samples will be collected, as well as one trip blank per cooler.

A technical memorandum or letter report will be submitted to the EPA detailing the results of the "spot plume" investigation.

QAPP WORKSHEET #18
SAMPLING LOCATIONS/IDS, SAMPLE DEPTHS, SAMPLE ANALYSES, AND SAMPLING PROCEDURES TABLE

(UFP QAPP Section 3.1.1)

Sampling Location/ ID Number[1]	**Matrix**	**Depth (feet bgs)**	**Analytical Group**	**Sampling SOP Reference [2]**
17 VAS locations	Groundwater[3]	10 to 150	FASP-VOA-MS (Field VOC) CLP SOW SOM01.2 (VOA)	S-6, Procedures on worksheet #17
11 VAS-PSA locations	Groundwater[4]	10 to 50	FASP-VOA-MS (Field VOC) CLP SOW SOM01.2 (VOA)	S-6, Procedures on worksheet #17
94 residential wells	Groundwater[5]	Varied	CLP SOW SOM01.2 (VOA, SVOA, PCBs, and pesticides) CLP SOW ILM05.4 (TAL metals, mercury)	S-6
50 locations	Groundwater[6]	10 to 150	CLP SOW SOM01.2 (VOA, SVOA, PCBs, and pesticides) CLP SOW ILM05.4 (TAL metals, mercury, cyanide)	S-6
50 locations	Groundwater[7]	13 to 20	CLP SOW SOM01.2 (VOA)	S-14
80 soil gas locations	Air[8]	5 to 20	TO-15	S-14
66 sub-slab locations	Air[9]	0	TO-15	S-14
44 indoor locations	Air[10]	0	TO-15	S-14
40 ambient air locations	Air[11]	0	TO-15	S-14
11 grab groundwater locations	**Groundwater[12]**	**10-20**	**CLP-VOA- SOM02.3** **CLP-SVOA- SOM02.3 (for 1,4-dioxane)**	**S-6**
4 monitoring well locations	**Groundwater[13]**	**8-22, depending on location**	**CLP-VOA- SOM02.3** **CLP-SVOA- SOM02.3 (for 1,4-dioxane)**	**S-6**
9 private residential wells	**Groundwater[14]**	**Varied**	**CLP-VOA- SOM02.3** **CLP-SVOA- SOM02.3 (for 1,4-dioxane)**	**S-6**
25 locations (up to two depths each location, total of 50 samples)	Soil[15]	Any 2-ft interval between surface and 150 ft bgs	CLP SOW SOM01.2 (VOA, SVOA, PCBs, and pesticides) CLP SOW ILM05.4 (TAL metals, mercury) ASTM D422-63 (Grain size distribution) ASTM D 4404-84 (Porosity) Dichromate Oxidation Method (TOC)	S-1

Notes:

ASTM	American Society for Testing and Materials	PSA	Potential source area
GC	Gas chromatograph	TOC	Total organic carbon
ID	Identification	VAS	Vertical aquifer sampling

1 See Figure B-3for sampling locations; see FSP Section A8.2.2 for sample identification.
2 See Worksheet #21 for a list of sampling methods S-1 through S-6.
3 Samples will be collected at 10-ft intervals, between the water table and 150 ft bgs, from each location.
4 Samples will be collected at 10-ft intervals, between the water table and 30 ft bgs, from each VAS-PSA location numbered from VAS-PSA-101 through VAS-PSA-108.
Samples will be collected at 10-ft intervals, between the water table and 50 ft bgs, from each VAS-PSA location numbered from VAS-PSA-109 through VAS-PSA-113.
5 Samples will be collected from 94 private residential drinking water wells before in-line filters or treatment.
6 Samples will be collected from 40 newly installed monitoring wells; exact well locations will be finalized after residential and VAS sampling is completed.
7 Samples will be collected at the water table, approximately 13 to 20 ft bgs, from each location.
8 Samples will be collected at least 5 ft bgs and 3 ft above the water table, from each location.
9 Samples will be collected at immediately below the concrete or soil surface in the basement, from each location.
10 Samples will be collected in the location where vapor intrusion is most likely to occur such as the basement or the crawl space.
11 Samples will be collected on a rate of one per day of indoor air sampling.
12 Samples will be collected at the water table and 5 to 10 feet below the water table.
13 Samples will be collected from only the shallow or the water table wells from each well cluster.
14 Samples will be collected from up to 9 private residential drinking water wells before any in-line filters or treatment, if possible, or at the kitchen sink.
15 Samples will be collected and submitted for chemical analysis from soil borings during monitoring well installation if evidence of gross contamination is noted. 10 soil samples will be collected and submitted for grain size distribution, porosity, and TOC analysis.

QAPP WORKSHEET #19
ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES TABLE

(UFP QAPP Section 3.1.1)

Matrix	**Analytical Group**	**Analytical and Preparation Method**	**Containers (number, size, type)**	**Preservation Requirements (chemical, temperature, etc.)**	**Maximum Holding Time (preparation/analysis)[1]**
Water	VOCs	**CLP SOW SOM02.3** TRACE	**Four 40-mL amber glass vials with PTFE-lined septa and open-top screw caps**	No headspace Cool to 4 ºC ± 2 ºC Adjust pH to less than 2 with HCl	7 days/14 days
Water	SVOCs	**CLP SOW SOM02.3**	Two 1-liter amber glass bottles fitted with PTFE-lined screw caps	Cool to 4 °C ± 2 °C immediately after collection; keep away from light	7 days/40 days
Water	PCBs	CLP SOW SOM01.2	Two 1-liter amber glass bottles fitted with PTFE-lined screw caps	Cool to 4 °C ± 2 °C immediately after collection; keep away from light	7 days/40 days
Water	Pesticides	CLP SOW SOM01.2	Two 1-liter amber glass bottles fitted with PTFE-lined screw caps	Cool to 4 °C ± 2 °C immediately after collection; keep away from light	7days/40 days
Water	TAL Metals, Mercury	CLP SOW ILM05.4	One 1-liter high-density polyethylene bottle One 1-liter high-density polyethylene bottle with 0.45-µm filter for filtered surface water sample	HNO_3 to pH < 2 and cool to 4 ˚C (±2 ˚C) immediately after collection	NA/6 months (Metals) NA/28 days (mercury)

QAPP WORKSHEET #19 (CONTINUED)
ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES TABLE

Matrix	Analytical Group	Analytical and Preparation Method	Containers (number, size, type)	Preservation Requirements (chemical, temperature, etc.)	Maximum Holding Time (preparation/analysis) [1]
Soil	VOCs	CLP SOW SOM01.2	Three (2-$NaHSO_4$ and 1-CH_3OH) 40-mL glass containers with PTFE-lined septa and open-top screw caps, pre-weighed and containing magnetic stir bars and one container of sample filled with no headspace for determination of moisture content OR At least three coring tools used as transport devices (for example, 5-gram samplers) and one container of sample filled with no headspace for determination of moisture content	Cool to 4 °C ± 2 °C immediately after collection Frozen (-7 °C to -15 °C)	48 hours to preservation at laboratory/14 days for analysis following preservation 48 hours (frozen) to preservation at laboratory for analysis after preservation
Soil	SVOCs	CLP SOW SOM01.2	Two 4-ounce or one 8-ounce wide-mouth glass jar	Cool to 4 °C ± 2 °C immediately after collection	14 days/40 days
Soil	PCBs	CLP SOW SOM01.2	Two 4-ounce or one 8-ounce wide-mouth glass jar	Cool to 4 °C ± 2 °C immediately after collection	14 days/30 days
Soil	Pesticides	CLP SOW SOM01.2	Two 4-ounce or one 8-ounce wide-mouth glass jar	Cool to 4 °C ± 2 °C immediately after collection	14 days/40 days
Soil	TAL Metals, Mercury	CLP SOW ILM05.4	Two 4-ounce or one 8-ounce wide-mouth glass jar	Cool to 4 °C ± 2 °C immediately after collection	NA/6 months - Metals 28 days - mercury
Soil	Grain size distribution	ASTM D422-63	Two 1-gallon Ziploc bags of sample	NA	NA
Soil	Porosity	ASTM D 4404-84	1-foot section of undistributed sample in liner	NA	NA
Soil	TOC	Dichromate Oxidation Method	One 4-ounce wide-mouth glass jar	Cool to 4 °C ± 2 °C immediately after collection	28 days
Soil Gas	VOCs	Method TO-15 and Method TO-15 SIM	One Summa canister (6-Liter)	Hold at ambient temperature	Up to 30 days

QAPP WORKSHEET #19 (CONTINUED)
ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIMES TABLE

Notes:

µm	Micrometer	PCB	Polychlorinated biphenyl
ASTM	American Society for Testing and Materials	PTFE	Polytetrafluoroethylene
CH_3OH	Methanol	SOW	Statement of work
CLP	Contract laboratory program	SVOC	Semi-volatile organic compound
HCl	Hydrochloric acid	TAL	Target analyte list
HNO_3	Nitric acid	TOC	Total organic carbon
mL	Milliliter	VOC	Volatile organic compound
NA	Not applicable		
$NaHSO_4$	Sodium bisulfate		

1 Holding time is applicable from validated time of sample receipt and is measured to time of sample extraction and analysis.

QAPP WORKSHEET #20
FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

(UFP QAPP Section 3.1.1)

Matrix	Analytical Group	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations	No. of Samples	No. of Field Duplicates[2]	No. of MS/MSDs[3]	No. of Trip Blanks[4]	No. of Equipment Rinsates[5]	Total No. of Samples to Laboratory
Soil, if gross contamination is noted	VOA/CLP	A-1	25	50	5	3	10	3	71
Soil, if gross contamination is noted	SVOA/CLP	A-1	25	50	5	3	0	3	61
Soil, if gross contamination is noted	PCBs/CLP	A-1	25	50	5	3	0	3	61
Soil, if gross contamination is noted	Pesticides/CLP	A-1	25	50	5	3	0	3	61
Soil	TAL Metals, Mercury/CLP	A-2	25	50	5	3	0	3	61
Soil	Grain size distribution	A-5[6]	5	10	1	0	0	0	11
Soil	Porosity	A-6[6]	5	10	1	0	0	0	11
Soil	TOC	A-4[6]	5	10	1	0	0	0	11
VAS-Groundwater[7]	VOA/Mobile Lab	A-3	28	266	25	12	0	14	317
VAS-Groundwater[7]	VOA/CLP	A-1	28	28	3	2	6	0	39
RW-Groundwater	VOA/CLP	A-1	94	94	10	5	8	0	117
RW-Groundwater	SVOA/CLP	A-1	47	47	5	3	0	0	55
RW-Groundwater	PCB/CLP	A-1	47	47	5	3	0	0	55
RW-Groundwater	Pesticide/CLP	A-1	47	47	5	3	0	0	55
RW-Groundwater	TAL Metals, Mercury/CLP	A-2	47	47	5	3	0	0	55
MW-Groundwater[8]	VOA/CLP	A-1	56	56	6	3	4	6	75
MW-Groundwater[8]	SVOA/CLP	A-1	56	56	6	3	0	6	69
MW-Groundwater[8]	PCB/CLP	A-1	56	56	6	3	0	6	69
MW-Groundwater[8]	Pesticide/CLP	A-1	56	56	6	3	0	6	69

QAPP WORKSHEET #20 (CONTINUED)
FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Matrix	Analytical Group	Analytical and Preparation SOP Reference[1]	No. of Sampling Locations	No. of Samples	No. of Field Duplicates[2]	No. of MS/MSDs[3]	No. of Trip Blanks[4]	No. of Equipment Rinsates[5]	Total No. of Samples to Laboratory
MW-Groundwater[8]	TAL Metals, Mercury/CLP	A-2	56	56	6	3	0	6	69
Vapor Intrusion - Groundwater	VOA/CLP	A-1	50	50	5	3	4	2	61
Air-Soil Gas	VOCs	A-7	80	80	8	0	0	0	88
Air – Sub-Slab	VOCs	A-7	66	66	6	0	0	0	72
Air – Indoor Air	VOCs	A-7	44	44	4	0	0	0	48
Air - Background	VOCs	A-7	40	40	4	0	0	0	44
Spot Plume Grab Groundwater	**VOA/CLP**	**A-1**	**11**	**22 (2 different depths)**	**2**	**1**	**2**	**0**	**27**
Spot Plume Grab Groundwater	**SVOA/CLP**	**A-1**	**11**	**22 (2 different depths)**	**2**	**1**	**0**	**0**	**25**
Spot Plume MW-Groundwater	**VOA/CLP**	**A-1**	**4**	**4**	**1**	**1**	**1**	**0**	**7**
Spot Plume MW-Groundwater	**SVOA/CLP**	**A-1**	**4**	**4**	**1**	**1**	**0**	**0**	**6**
Spot Plume RW-Groundwater	**VOA/CLP**	**A-1**	**9**	**9**	**1**	**1**	**1**	**0**	**12**
Spot Plume RW-Groundwater	**SVOA/CLP**	**A-1**	**9**	**9**	**1**	**1**	**0**	**0**	**11**

Notes:

Sample numbers in this table reflect field QC samples collected during each sampling event.

MW – Monitoring well locations
RW – Residential/private drinking water well location
VAS –Vertical aquifer sampling location

1 Analytical and preparation SOPs are listed in Worksheet #23.
2 Field duplicates are collected at a rate of 1 per 10 investigative samples of the same matrix.
3 MS/MSD samples are collected at a rate of 1 per 20 investigative samples of the same matrix.
4 A trip blank will be provided with each shipping container to be analyzed for VOCs.
5 Equipment blank samples are collected at a rate of 1 per 20 investigative samples of the same matrix.
6 Sampling method/procedure to be finalized once lab is procured, after FSP and QAPP approval.
7 VAS-Groundwater matrix samples include 17 VAS locations and 11 VAS-PSA locations.
8 MW-Groundwater matrix samples include 24 newly installed VAS wells and 16 newly installed VAS-PSA wells.

QAPP WORKSHEET #33
QA MANAGEMENT REPORTS TABLE

(UFP QAPP Section 4.2)

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Name, Title, Organization)	Report Recipient(s) (Title and Organization)
Phase IA Data Validation Report	Once for field sampling, Phase IA	21 days after receipt of Phase IA analytical results from laboratory	Richard Baldino, Project QA Officer, SulTRAC	Syed Quadri, WAM, EPA Region 5
Remedial Investigation Report	Once for all field sampling for both Phase IA and Phase II	September 30, 2012	William Earle, Project Manager, SulTRAC	Syed Quadri, WAM, EPA Region 5
Spot Plume Investigation Report (Technical Memorandum or Letter Report)	**Once for all groundwater sampling activity for Spot Plume Investigation**	**March 2017**	**William Earle, Project Manager, SulTRAC**	**Karen Kirchner, WAM EPA Region 5**

TABLE B-2: SAMPLING SUMMARY

Sample Type	Sample ID	Matrix	No. of Sampling Locations	No. of Samples per Location	Total No. of Samples per Sample Type	QA/QC Samples			Total No. of Samples [a]			
						Field Duplicates	MS/MSD	Trip/ Equipment Blank	VOC by Field GC	VOC by CLP	SVOC, TAL Metals, PCB, Pesticides by CLP	TOC, Grain Size, Porosity [g]
Private Residential Wells [b]	RW	Groundwater	94	1	94	10	5	8	0	117	55	0
Vertical Aquifer Sampling (VAS)	VAS [c]	Groundwater	17	14	238	24	12	4	238	24	0	0
	VAS-PSA [d]	Groundwater	8	2	16	2	1	1	16	2	0	0
	VAS-PSA [h]	Groundwater	3	4	12	2	1	1	12	2	0	0
Soil Borings [e]	VAS-SO	Soil	25	2	50	5	3	14	0	0	50	10
Monitoring Wells [f]	MW	Groundwater	50	1	50	5	3	10	0	34	16	0
Vapor Intrusion - Groundwater	VI-GW	Groundwater	50	1	50	5	3	6	0	61	0	0
Vapor Intrusion – Soil Gas	VI-SG	Air	80	1	80	8	0	0	0	0	0	0

TABLE B-2
SAMPLING SUMMARY (CONTINUED)

Sample Type	Sample ID	Matrix	No. of Sampling Locations	No. of Samples per Location	Total No. of Samples per Sample Type	QA/QC Samples			Total No. of Samples [a]			
						Field Duplicates	MS/MSD	Trip/ Equipment Blank	VOC by Field GC	VOC by CLP	SVOC, TAL Metals, PCB, Pesticides by CLP	TOC, Grain Size, Porosity [g]
Vapor Intrusion – Sub-Slab	VI-SS	Air	66	1	66	6	0	0	0	0	0	0
Vapor Intrusion – Indoor Air	VI-IA	Air	44	1	44	4	0	0	0	0	0	0
Vapor Intrusion - Background	VI-BG	Air	40	1	40	4	0	0	0	0	0	0
Spot Plume Grab Groundwater Samples	**SP-GW**	**GW**	**11**	**2**	**22**	**2**	**1**	**2**	**0**	**27**	**25**	**0**
Spot Plume Monitoring Wells	**SP-MW**	**GW**	**4**	**1**	**4**	**1**	**1**	**1**	**0**	**7**	**6**	**0**
Spot Plume Private Residential Wells	**SP-RW**	**GW**	**Up to 9**	**1**	**9**	**1**	**1**	**1**	**0**	**12**	**11**	**0**
TOTAL (for Spot Plume Investigation)					**39**	**4**	**3**	**4**	**0**	**50**	**46**	**0**

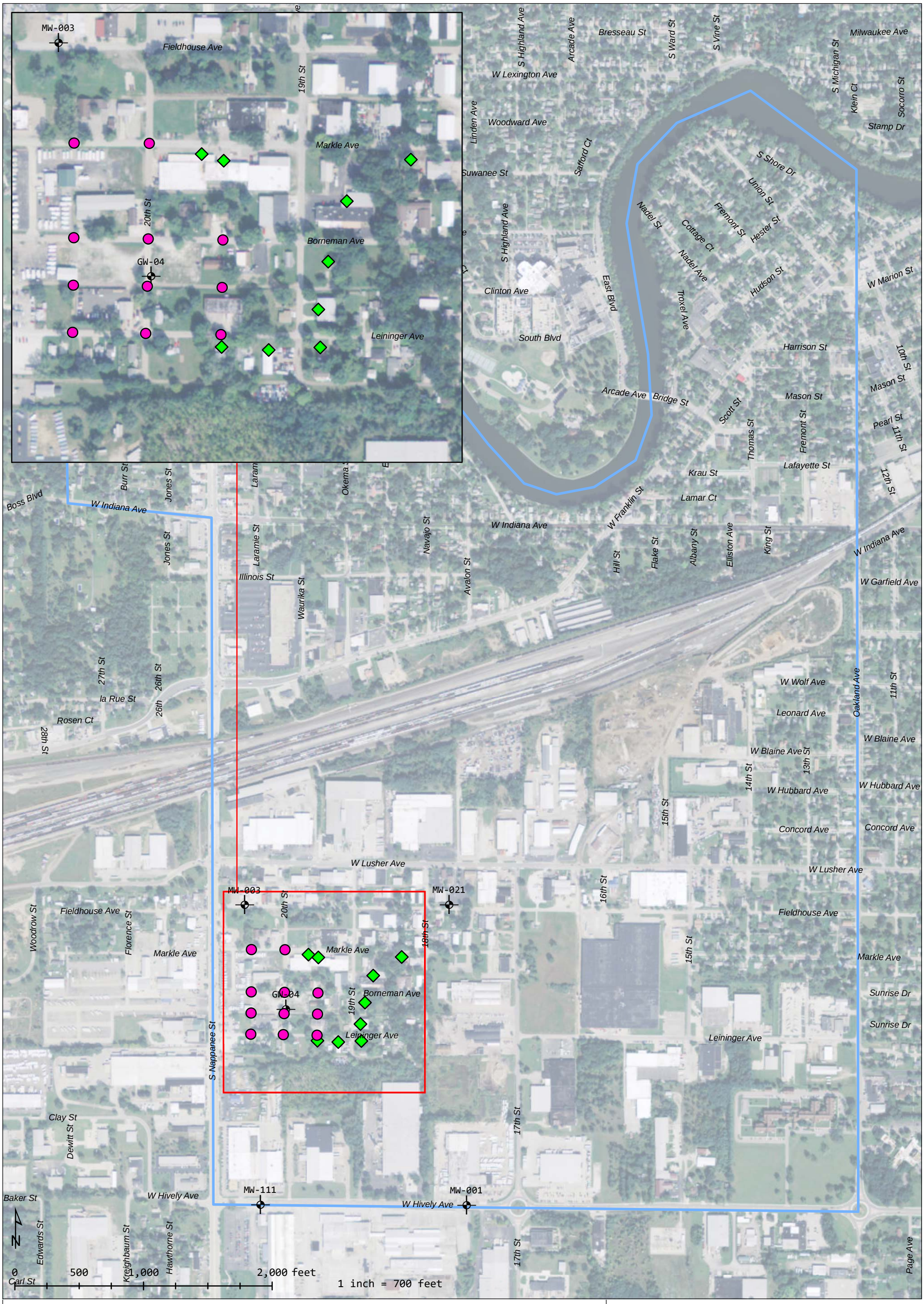
Notes:

CLP	Contract Laboratory Program	RW	Residential well
GC	Gas chromatograph	SO	Soil
GW	Groundwater	SVOC	Semivolatile organic compound

TABLE B-2
SAMPLING SUMMARY (CONTINUED)

MW	Monitoring well	TOC	Total organic carbon
PCB	Polychlorinated biphenyl	VAS	Vertical aquifer sampling
VOC	Volatile organic compound	VI	Vapor Intrusion
BG	Background	IA	Indoor Air

a Total number of samples does not include field duplicate or QC samples.
b Fifty percent of samples from residential wells will be submitted for a full suite of CLP analyses.
c Samples will be collected at 10-foot intervals from the groundwater table (assumed to be 10 ft bgs) to a maximum depth of 150 feet bgs.
d Samples will be collected at 10-foot intervals from the groundwater table (assumed to be 10 ft bgs) to a maximum depth of 30 feet bgs.
e Up to two soil samples will be collected from each monitoring well location during well installation. Soil samples will be collected only if evidence of gross contamination is observed.
f Up to two monitoring wells will be installed at each VAS location. Final screen depths will be decided in the field based on depth of groundwater and evidence of contamination.
g TOC, grain size distribution, and porosity analyses will be conducted by subcontract laboratories.
h Samples will be collected at 10-foot intervals from the groundwater table (assumed to be 10 ft bgs) to a maximum depth of 50 feet bgs.



Proposed geoprobe sampling location

Proposed residential grab sampling location

Groundwater sampling location

Site boundary

Notes:
1) Locations are approximate
2) Basemaps source: Esri

document path: D:\projects\Lusher Street_FSP\FSP proposed sampling.mxd author: aschubert

LUSHER STREET GROUNDWATER CONTAMINATION SITE
ELKHART COUNTY, INDIANA

FIELD SAMPLING PLAN ADDENDUM

FIGURE 1

SPOT PLUME PROPOSED SAMPLE LOCATIONS

EPA REGION 5 RAC 2 | REVISION 0 | DECEMBER 2016

SulTRAC